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INTRODUCTION

- When patients require revision of primary shoulder arthroplasty, revision reverse total shoulder arthroplasty (rTSA) is most performed.
- However, defining clinically-important improvement in these patients is challenging because benchmarks have not been previously defined.
- Our purpose was to define the minimal clinically important difference (MCID), substantial clinical benefit (SCB), and patient acceptable symptomatic state (PASS) for outcome scores and range of motion (ROM) after revision rTSA and to quantify the proportion of patients achieving clinically-relevant success.

METHODS

- This retrospective cohort study used a prospectively-collected single-institution database of patients undergoing revision RTSA between August 2015 and December 2019.
- Patients with a diagnosis of infection were excluded. Outcomes scores included the ASES, raw and normalized Constant, SPADI, SST, and UCLA scores. ROM measures included abduction, forward elevation (FE), external rotation (ER), and internal rotation (IR) score.

Definitions:

- **Anchor-based MCID** for each outcome metric was calculated as the difference in preoperative-to-postoperative improvement between the cohort of patients who designated their shoulder as “better” and the cohort of patients who described their shoulder as “worse” or “unchanged”.
- **Distribution-based MCID** was also calculated for each metric defined as 50% of the standard deviation for the preoperative-to-postoperative improvement values.
- **Anchor-based SCB** for each outcome metric was calculated as the difference in preoperative-to-postoperative improvement between the cohort of patients who reported their shoulder as “much better” and the cohort of patients who reported their shoulder as “worse” or “unchanged”.
- **PASS** was defined as the highest level of symptom beyond which patients consider themselves well. Quantitatively, this was assessed using the 75th percentage approach which identifies the cut-point corresponding to the 75th percentile of the outcomes for preoperative-to-postoperative improvement in patients who report an important improvement by the anchoring question (“better” or “much better”).

Analysis:

- Thresholds were determined from 500 bootstrap replicates. The mean, standard deviation (SD), and 95% confidence interval (CI) were reported.
- The proportions of patients achieving each threshold were assessed.

RESULTS

- 108 revision RTSAs with minimum 2-year follow-up were evaluated
- Mean age was 67 years
- 59% were female
- Average follow-up was 55 months
- Revision RTSA was performed most for failed:
 - Anatomic TSA (n=53)
 - Hemiarthroplasty (n=26)
 - RTSA (n=18)
 - Resurfacing (n=11)
- Indication for revision RTSA was most commonly:
 - Glenoid loosening or rotator cuff failure (n=25 for both)
 - Instability (n=21)
 - Unexplained pain (n=11)

Thresholds and proportion of shoulders achieving the MCID, SCB, and PASS for the overall cohort

Outcome Score	Mean ± SD	95% CI*	% of shoulders achieving
MCID (anchor)			
ASES	20.1 ± 6.2	[8.6 to 32.6]	42.2%
Raw Constant	10.5 ± 4.3	[3.0 to 18.9]	79.5%
Normalized Constant	12.6 ± 5.1	[3.8 to 22.8]	79.5%
UCLA	10.2 ± 1.8	[7.2 to 13.6]	54.2%
SST	0.9 ± 1.0	[-0.8 to 3.0]	78.3%
SPADI	-18.4 ± 6.7	[-32.5 to -5.7]	57.8%
Abduction (°)	13.3 ± 9.5	[-4.6 to 32.0]	83.1%
FE (°)	18.1 ± 10.0	[-0.2 to 37.1]	81.9%
ER (°)	3.5 ± 7.5	[-11.8 to 17.1]	49.4%
IR score	0.8 ± 0.6	[-0.3 to 2.0]	33.7%
MCID (distribution)			
ASES	12.9 ± 1.1	[10.8 to 15.1]	56.6%
Raw Constant	8.6 ± 0.7	[7.1 to 10.0]	81.9%
Normalized Constant	10.1 ± 0.9	[8.4 to 11.9]	81.9%
UCLA	4.2 ± 0.3	[3.5 to 4.8]	71.1%
SST	1.8 ± 0.1	[1.6 to 2.0]	69.9%
SPADI	13.7 ± 0.9	[12.0 to 15.6]	95.2%
Abduction (°)	16.7 ± 1.3	[14.2 to 19.2]	80.7%
FE (°)	18.1 ± 1.5	[15.0 to 20.9]	81.9%
ER (°)	11.9 ± 1.0	[10.0 to 13.9]	20.5%
IR score	1.0 ± 0.1	[0.8 to 1.1]	33.7%
SCB			
ASES	34.1 ± 5.9	[23.5 to 45.5]	25.3%
Raw Constant	22.7 ± 4.1	[14.6 to 31.2]	38.6%
Normalized Constant	26.6 ± 4.9	[16.9 to 36.9]	43.4%
UCLA	14.1 ± 1.6	[11.0 to 17.3]	27.7%
SST	3.9 ± 0.8	[2.4 to 5.6]	48.2%
SPADI	-36.4 ± 5.7	[-47.3 to -25.0]	32.5%
Abduction (°)	20.2 ± 9.4	[0.5 to 38.0]	77.1%
FE (°)	28.1 ± 10.1	[8.5 to 49.2]	71.1%
ER (°)	15.0 ± 7.0	[1.8 to 28.3]	14.5%
IR score	1.0 ± 0.5	[0.1 to 2.1]	28.9%
PASS			
ASES	63.5 ± 3.3	[55.0 to 69.8]	52.7%
Raw Constant	50.9 ± 2.5	[45.5 to 55.8]	57.0%
Normalized Constant	59.1 ± 3.4	[52.0 to 64.6]	61.3%
UCLA	25.4 ± 0.8	[24.0 to 27.0]	48.4%
SST	7.0 ± 0.9	[6.0 to 8.0]	54.8%
SPADI	42.4 ± 3.6	[36.6 to 49.3]	59.1%
Abduction (°)	98.1 ± 4.2	[90.0 to 104.7]	61.3%
FE (°)	110.2 ± 5.0	[97.5 to 115.1]	55.9%
ER (°)	18.8 ± 3.6	[10.0 to 24.0]	73.1%
IR score	3.3 ± 0.4	[2.7 to 4.0]	59.1%

See the full manuscript for stratified thresholds based on sex, type of primary shoulder arthroplasty, and reason for revision.



CONCLUSION

- This study establishes thresholds for the MCID, SCB, and PASS at minimum 2-years after revision rTSA, providing physicians an evidence-based method to counsel patients and assess patient outcomes postoperatively.